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Reforming Water Pollution Regulation

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Introduction

Clean water is one of the most widely supported environmental goals in the United States. Yet, there is little agreement on how best to attain it. Strong divisions in Congress over legal and technical issues have delayed reauthorization of the federal government's major water pollution control law, the Clean Water Act, for over three years. [1]

This report examines the sources of water pollution and the effectiveness of federal efforts to regulate them. The purpose is to provide a sound basis for proposing ways in which the law can be improved. Political debates over regulatory reform in this area have been characterized by oversimplification. It is hoped that this report will contribute to a more rational debate.

This study reviews the major sources of surface water pollution, i.e., those affecting navigable rivers, lakes and streams. (Pollution of groundwater, wetlands and coastal areas are excluded from consideration here.) Next, the evolution of federal water pollution control legislation and its key features are examined, and the successes and failures of these laws are evaluated. Finally, the most recent legislative proposals for maintaining federal water pollution management are assessed, and recommendations for improving the laws are presented.

Water Pollution Sources

Water pollution occurs when the quantity of wastes flowing into a stream overwhelms its capacity to assimilate pollutants; the natural cleansing ability of oxygen is compromised, and the water can no longer break down organic pollutants, making it unsuitable for certain uses. The depletion of oxygen can be caused by excessive loads of sediment from soil erosion, or by toxic pollutants from settled air pollution or industrial waste.

Excessive nutrients from agricultural activities (water-borne animal wastes and fertilizers) and municipal sewage can cause eutrophication, a choking ecological imbalance that favors algae growth at the expense of other forms of aquatic life. Large algae formations at the surface deplete available oxygen and prevent sunlight from reaching submerged vegetation. Photosynthesis—the process by which plants produce food and oxygen— is seriously hampered, reducing both support for aquatic life and the assimilative capacity of the stream.

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Materials that produce water pollution may enter streams directly or indirectly. Pollutants from a point source such as a factory or a sewage plant are disposed directly into streams. Point source discharges occur in a fairly predictable manner. Ordinarily, these sources generate waste as part of an ongoing production or treatment process. Thus, the level and composition of pollution is relatively consistent. Wastewater from these sources enters a stream at a specific point, making it possible to monitor the quality of effluent discharged. Point sources are relatively easy to regulate. Since their polluting "systems" are both stationary and conspicuous, it is possible to locate polluters and control their behavior by issuing them permits, making enforcement possible.

In contrast, pollution from nonpoint or area sources enter indirectly, in a much less predictable manner. Rainstorms and melting snow produce runnoff, which carries pollutant-laden sediment and debris from forests and farms, construction sites, and city sewers and streets. Agricultural runoff often contains excessive concentrations of fertilizers and pesticides. Urban runoff carries settled automobile-related pollutants, animal wastes, litter, salt and other de-icing solutions.

Nonpoint sources are not closed systems that discharge an expected amount of pollution. Discharges are intermittent and entirely dependent on a varying set of geographic and weather related conditions. Degradation of water from nonpoint sources is caused by the cumulative effect of all the pollutants that originate from large land areas within a given watershed. It is very difficult to trace a specific quantity of pollution to a single source, or even a local one. A water quality problem experienced downstream can originate from farms or cities hundreds of miles upstream.

While an effective control policy may reduce nonpoint source pollution, it is not a problem that is going to be eliminated. Adverse weather conditions can render even the best possible control program ineffective. For instance, during an extended dry period, the accumulation of pollutants on land surfaces can be substantial. When runoff occurs, pollutants will enter streams in very high concentrations; these "shock loads" normally overwhelm even streams with a high assimilative capacity. Thus, the level of nonpoint pollution appears to be the controlling factor in water quality degradation.

The extent to which nonpoint shock loads compromise water quality also depends on "natural" conditions such as stream characteristics—water temperature, chemical composition, and the rate of flow, all of which vary seasonally. Yet, even a healthy stream at peak assimilative capacity cannot break down all types of pollutants. Some materials are not degradable. Scientific research and the development of new products have produced a whole range of new and complex pollutants that water cannot assimilate.

National figures on the relative contribution of nonpoint sources to water quality degradation have not been fully developed. Preliminary data from Resources for the Future (RFF) indicate that in many areas, a majority of toxics come from urban runoff, even in cities like Houston, where there are a significant number of industrial point sources.[2]

Table 1

DISCHARGE OF CONVENTIONAL POLLUTANTS TO WATERWAYS BY SOURCE

(Percent of Total Discharge)

	Biochemical Oxygen Demand	Total Suspended Solids	Total Dissolved Solids	Total Phosphorous	Total Nitrogen
Point Sources					
Municipal	18.0	0.1	1.7	2.9	7.9
Industrial	25.0	1.5	15.6	10.3	3.9
Subtotal	43.0	1.6	17.3	13.2	11.8
Nonpoint Sources					
Cropland	21.0	30.4	25.6	27.3	37.0
Urban	2.0	0.3	0.4	0.1	--
Other*	34.0	67.7	56.7	59.4	51.2
Subtotal	57.0	98.4	82.7	86.8	88.2
TOTAL	100.0	100.0	100.0	100.0	100.0

*Includes construction, mining, erosion, irrigation return flow, oil spills, unsewered household discharge, forestry, and livestock activities.

Source: Resources for the Future.

Findings on certain conventional pollutants are more conclusive. As Table 1 shows, nonpoint sources discharge over half of Biochemical Oxygen Demand (BOD, a measure of oxygen-demanding substances that can be broken down by water), nearly all suspended solids (sediment), and most of the dissolved solids, phosphorous and nitrogen.

Several nationwide surveys affirm the importance of nonpoint source pollution. In the most recent biennial state water quality reports (required under Section 305(b) of the Clean Water Act), virtually all of the states and territories acknowledged that they have serious nonpoint source pollution problems.

At least half of these characterized the problem as "major." Eighteen states considered agriculture the most serious nonpoint source, while urban runoff was cited as the second most serious contributor. In addition, 40 of the 45 states that participated in the States' Evaluation of Progress project conducted by the Association of State and Interstate Water Pollution Control Administrators believe that effective control of nonpoint sources is required for any significant improvements in water quality.[3]

The Evolving Federal Role

Early Laws

Federal involvement in water pollution control dates back to the 1899 Refuse Act which required a permit for dumping into navigable waters. This program was administered by the Army Corps of Engineers and its main purpose was to prevent the obstruction of navigation along interstate and coastal waters.

With the passage of the Federal Water Pollution Control Act in 1948, the U.S. government recognized water pollution as a potential ecological and public health hazard. The law left primary responsibility for control and enforcement to the states; the federal role was limited to technical support and some financial aid for the construction of sewage treatment plants.

The Act directed the Surgeon General to encourage pollution abatement through research and investigation. The legislation also called for regulation under a water quality standards approach. First, state and local authorities designated the primary beneficial use of a particular waterway— fishing, boating, drinking or irrigating, for example. Then they set discharge standards that they believed would protect that use.

Even though it identified public health as a factor of "paramount importance," the law permitted courts to require pollution reduction only after "giving due consideration to the practicability and to the physical and economic feasibility of securing abatement of any pollution proved."[4]

The Act did authorize a fund of $22.5 million annually from which low-interest (2 percent) loans could be made to local publicly owned treatment works (POTWs). In order to be eligible for a loan, a local POTW had to have its plan approved by both the Surgeon General and the Federal Security Administrator. Loans were also limited to one-third of capital expenditures or $250,000, whichever was smaller.

However, funds were never actually appropriated for loans until the Act was amended in 1956.[5] By that time, the low-interest loans had become grants, and the amount authorized for this purpose had been doubled. The federal share of a particular project was determined by a formula based on the state's per capita income. In addition, the law stipulated that 50 percent of all grants were to go to communities with populations of less than 125,000.

Though Congress was careful to reaffirm the primary responsibility and

jurisdiction of the states in 1956, the federal role was expanded nonetheless. With the establishment of a federal enforcement mechanism—a conference procedure with hearing boards and court injunctions—the states' authority was superseded by the federal government. At first, federal jurisdiction applied only to interstate waters but the 1961 amendments extended it to all navigable waters and coastal waters.[6]

With passage of the Water Quality Act of 1965, the federal government became directly involved in the states' standard-setting process. The law required states to establish ambient water quality standards based primarily on the classified use of a stream. These standards were subject to federal approval. States without approved plans had to adopt federally established standards.

As a national environmental consciousness developed in the late 1960s, water pollution laws came under greater criticism. Highly publicized examples of grossly polluted rivers and lakes –with photos of fish-kills and reports of rivers catching fire—became increasingly common.

By 1970, a developing consensus in government held that the major shortcoming in the legislation was the lack of enforcement provisions. Essentially, government officials had to establish a clear cause-and-effect link between an individual polluter and the degradation of water quality below existing standards. Without adequate technical capability, it was difficult to establish such a precise connection, particularly when many dischargers used the same stream. The problem was even more complicated in the case of interstate streams.

Furthermore, state authorities usually lacked the necessary scientific techniques for determining how much pollution a body of water could assimilate without dropping below the intended water quality level. As a result, states found it difficult to issue permits under a water quality standards scheme, leading lawmakers to establish a federal system of permits under the Water Quality Improvement Act of 1970.

This law adopted a program comparable to the one set up under the 1899 Refuse Act; it focused primarily on sources of pollution—characteristics of a receiving stream had no role in the determination of policy. This fundamental shift to technology-based standards was induced by widely held perceptions that the water quality standards approach had failed. After congressional hearings concluded that many thousands of industrial plants were discharging wastes into navigable waters without a permit under the 1899 Refuse Act, then-President Nixon issued an executive order directing adoption of a permitting program under the 1899 Act.

A Major Initiative: The 1972 Amendments

The gradual federal encroachment on the states' water pollution responsibilities culminated in the 1972 Amendments to the Federal Water Pollution Control Act. The title of the bill is somewhat misleading, however, for it suggests that mere additions were made to an existing law. In reality, the 1972 legislation was a completely new law—a "massive new effort"[7] that sought not merely to control pollution, but to eliminate it entirely.

The 1972 Amendments set a goal of "zero-discharge" by 1985. Until such time, the interim goal, wherever attainable, was to make lakes and streams swimmable and fishable by July 1, 1983. Both goals were widely regarded as unattainable and unenforceable at the national level. Nevertheless, supporters of the law defended them by distinguishing a "goal" from a legally required "policy."

The gradual federal encroachment on states' water pollution responsibilities culminated in 1972 with legislation that sought not merely to control pollution, but to eliminate it entirely.

Goals, they argued, were only intended to serve as a focal point for developing long-range policy planning for industry and government. With a zero-discharge goal in place, it was reasoned, using water resources for waste disposal could no longer be taken for granted. Presumably, new industrial processes would have to be developed. Materials would have to be recycled, or at least treated before being discharged into the water.

Following the precedent established under the Water Quality Act of 1970, the 1972 Act focused largely on effluent standards. In other words, the law sought to regulate the quality of the wastewater discharged, with considerably less attention given to the actual effect of pollution on water quality. Technology-based standards were to be established for plants within the same industry and applied uniformly throughout the nation.

Industries were required to meet minimum standards—Best Practicable Technology (BPT)—by July 1, 1977. In general, this was defined as the average level of treatment attained by well-operated plants within a given industrial category. The law also required industrial dischargers to achieve a more stringent level of treatment—Best Available Technology (BAT)—by July 1, 1983.

Municipal dischargers or publicly owned treatment works (POTWs) were required to meet effluent limitations based on "secondary treatment" by July 1, 1977; 85 percent of the conventional pollutants in municipal wastes had to be removed by that deadline. Since some industrial plants discharge their wastewater into municipal sewers and POTWs, the law also required these "indirect" dischargers to "pretreat" any pollutants that might interfere with the effective operation of a POTW, or that might pass through the process entirely untreated.

In order to implement the technology-based standards, Section 402 of the 1972 Act established the National Pollutant Discharge Elimination System. This regulatory mechanism provided for the issuance, renewal and upgrading of permits for all point sources. These permits were the basis for a much simpler enforcement. Either a plant was in violation of its permit or it was not. The government no longer had to prove damage in order to punish a polluter.

Nevertheless, this simplified enforcement process carried with it a burdensome administrative cost. To begin with, the information required in a permit is substantial. Each permit must list not only the limitations on both the amount

and concentration of substances that can be legally discharged, but also such information as compliance schedules for construction and the submission of reports; penalties for permit violations and procedures through which permits may be modified; as well as monitoring and record keeping requirements. EPA had to write approximately 75,000 permits, an onerous task that became even more so as requirements became increasingly more sophisticated.

Though the permitting process covered only point discharges, the importance of nonpoint sources was tacitly recognized in Section 208 of the 1972 law. This "Areawide Waste Treatment" provision had a significant nonpoint source component. State and local authorities were required to develop a process for identifying significant nonpoint sources and to set forth control procedures, including, where appropriate, land use regulations.

Congress intended Section 208 to serve as a "control tower" for the entire Act.[8] It was hoped that areawide planning of all water pollution activities (including Best Management Practices (BMPs), pretreatment, and POTW construction and operation) for the present and future would bring a badly needed degree of rationality to the effort, and expedite state achievement of water quality goals.

Congress also hoped to facilitate attainment through a substantial strengthening of financial assistance to municipalities. A more generous fiscal "carrot" was offered to help speed up municipal construction of sewage treatment facilities and insure compliance with the stringent effluent requirements of the law; $20.75 billion was authorized for construction grants with the federal government paying 75 percent of all project costs.

A Shift to the Control of Toxics: The 1977 Clean Water Act

Although the Clean Water Act of 1977 has been called a "midcourse correction,"[9] the law essentially "stayed the course"—by maintaining its effluent standards-based regulatory strategy, and continuing the main focus on point sources. Nevertheless, the 1977 effort responded to the practical problems encountered previously.

First, the unrealistic compliance deadline for secondary treatment of municipal wastes was extended to July 1, 1983. The 1972 effluent limitations for industry were altered and deadlines extended. More stringent controls were reserved for more damaging pollutants. Priority toxic pollutants were to be controlled through the use of Best Available Technology (BAT), while conventional pollutants were to be regulated through Best Conventional Technology (BCT), a more flexible level of control comparable to secondary treatment. BCT and BAT had to be achieved by July 1, 1984.

Construction Grant Reform: The 1981 Amendments

The Clean Water Act of 1977 also continued the construction subsidy program for sewage treatment plants with an authorization of $25.5 billion. Despite this enormous federal commitment, the program was severely criticized. In late 1980, the House Public Works and Transportation Committee released a report that lamented:

> Despite more than seven years of effort, the lion's share of the nation's municipal treatment problem has yet to be addressed. As of September 1980, fewer than 2,300 municipal wastewater treatment projects, valued at $2.8 billion, had been completed. More than half of the nation's 20,000 plus municipal dischargers, including 106 of the largest urban areas, have yet to comply with the 1977 treatment requirement.[10]

The congressional report confirmed similar conclusions reached in a General Accounting Office (GAO) study of the same year. In a sample of 242 plants in 10 states, the agency determined that 87 percent were violating effluent discharge standards. The report concluded, "Many [of the plants] are not treating wastewater at the efficiency levels they were designed to achieve."[11]

Because grants focus solely on construction, localities have had every incentive to build elaborate systems whether or not they are needed, and whether or not they can afford to operate and maintain them.

Water pollution control professionals and the EPA claim that the reality of municipal compliance has been distorted. Due to the tremendous lead time necessary to complete projects, it is difficult to see significant progress in such a massive program. Even though the U.S. population increased 3.4 percent between 1976 and 1980, the portion of that population served by treatment plants increased by 17 percent. Also, during the same period, the number of people serviced by POTWs providing secondary treatment of wastewater increased by 25 percent.[12]

Nevertheless, serious problems remain, including: overdesigned facilities plagued by excessive cost overruns, inadequate planning and lengthy delays in implementation. Reports from Congress and GAO stress different combinations of these factors in assessing the causes of the program's poor performance. GAO highlighted technical shortcomings such as design and equipment deficiencies, and the lack of qualified operating and maintenance staffs.

The congressional survey faulted unrealistic compliance schedules and excessively stringent water quality goals. It also reported significant delays caused by an overly complicated regulatory process, noting that

> where once a municipality could expect to start and finish a project within two or three years, it now takes an average of eight years from the submission of a planning grant application by a local authority to the completion of construction.[13]

A fundamental shortcoming is in the nature of the grant process itself. First, because grants focus solely on construction, states and localities have had every incentive to build the most elaborate system currently available whether or not it is needed, and whether or not they can afford to operate and maintain it. The American Society of Civil Engineers states:

The construction grants program has resulted in high-tech, sophisticated (and over-designed) plants being built to serve a limited area that cannot or will not hire experienced operators to run them. Moshiem, Tennessee, for example, is installing a pressure sewer system with over 200 pumps and is not making provisions for maintenance. Another city passed a sewage rate ordinance promising to collect money for the operation and maintenance of the wastewater treatment plant. This money, however, is being used to extend sewer lines while the plant deteriorates.[14]

In an effort to improve the overall effectiveness of the program, the Reagan Administration pushed a major revision of the program through Congress in late 1981—perhaps the only significant regulatory reform achievement in the environmental area. The Municipal Wastewater Treatment Construction Grant Amendments of 1981 made the following key changes:

- Grants for the planning and design of treatment plants were eliminated;
- The federal share of project costs was reduced from 75 percent to 55 percent;
- The grants can only be applied to the construction of facilities that will meet current needs. Construction of reserve capacity to accommodate anticipated population growth must now be financed solely by localities; and
- Only those projects that will provide "secondary treatment" are eligible for grants. Projects designed to correct combined (sewage and storm water) sewer overflows, or to rehabilitate aging systems, or to construct collector sewers that carry sewage from homes to the main system, are no longer eligible. Finally, the definition of "secondary treatment" was revised to allow less complex systems to meet compliance standards.

The main intent of the revisions was to promote greater local responsibility. The reduction in federal share was meant as a signal to communities that federal financing will be phased out eventually. By eliminating grants for planning and design, the law provides an incentive for local authorities to develop more realistic projects within their range of financial and technical capability. Finally, by redefining what constitutes an acceptable level of "secondary treatment," about 3,900 small communities (most with populations under 10,000) will be able to forgo building costly and unnecessary plants, saving an estimated $2 billion.[15]

Evaluating the Clean Water Act

The Benefits and the Costs

Since its enactment, the Clean Water Act has been judged to have been at least moderately successful. A recent analysis from the Association of State and Interstate Water Pollution Control Administrators finds that despite significant pressures (more wastes from industry and people), degradation of water quality has been largely arrested.

However, data are limited. The Association based its report on state surveys of 444,000 miles of streams, about one-fourth of the national total. Of the streams that states reported on:

- 296,000 miles (67 percent) maintained the same quality;
- 47,000 miles (11 percent) improved;
- 11,000 miles (2 percent) were degraded; and
- changes for the remaining 90,000 miles (20 percent) were reported to be unknown.[16]

It is clear that a substantial portion of the nation's waterways still have serious water quality problems. Yet, some perspective is useful here. Between 1972 and 1982, the population of the United States increased by 11 percent. During the same period, the amount of oxygen-demanding pollutants entering wastewater plants grew by 12 percent—yet the amount released into the waterways dropped by 46 percent. Without the Clean Water Act and the subsequent improvement in treatment capabilities, it has been estimated that these types of discharges would have been 91 percent higher in 1982 than the levels actually discharged.[17]

Not all environmental observers feel that the Act has had a significant impact, however. Researcher Henry M. Peskin notes that the most obvious water quality gain has been in the level of dissolved oxygen content, which he writes:

> is a questionable achievement: in 1972—before the Act—only about 30 percent of the nation's waters failed to meet acceptable dissolved oxygen standards. More important, 10 years of effort have produced very little improvement with respect to nutrients, sediment, and toxic substances... but serious problems with these pollutants are likely to remain indefinitely, chiefly because of the Act's relative neglect of the main nonpoint sources of pollution—agricultural and urban runoff.[18]

Even though the benefits of the Clean Water Act have been uncertain, the costs of complying with the law have been huge.[19] Between 1972 and 1984, government and private business invested approximately $120 billion in water pollution control equipment. Operation and maintenance costs, combined with depreciation, totaled $205 billion. During this period, an average of $25 billion a year was spent to control water pollution in the United States (see Table 2).

Despite the enormous outlay of funds, the House Public Works and Transportation Committee attributed the limited progress to financial difficulties: "... the program has not performed as well as expected due primarily to uncertainties in funding [and] insufficient levels of funding."[20] Obviously, members of Congress believe that the right *amount* of money will solve the problem. Unfortunately, they pay less attention to how effective these expenditures are.

The Investment Record

With the Clean Water Act, Congress established two "primary mechanisms"[21] for achieving water quality goals—sewage treatment construction subsidies and uniform effluent standards for point source dischargers. In terms of water quality improvement, this basic strategy has constituted a poor investment.

Since 1972, the federal government alone has spent $40 billion to subsidize the construction of local POTWs, but the money has not always been well spent.

Table 2

CUMULATIVE COSTS OF COMPLYING WITH THE CLEAN WATER ACT, 1972-1984[a]

(billions of 1981 dollars)

	Investment Expenditures	Operating Costs[b]
Government Expenditures	$ 95.0	$148.0
Private Sector Expenditures		
Fuels and Energy	5.8	17.7
Food Processing	2.2	12.7
Chemicals	8.3	12.1
Metals	3.5	5.2
Soft Goods	3.8	8.3
Other Manufacturing	1.3	1.3
Total	$119.9	$205.3

Notes: a. Costs include only those associated with federal actions resulting from the Clean Water Act. They do not account for costs voluntarily incurred by polluters, required by state or local governments only, or mandated by other federal laws.

b. Operating costs include operating and maintenance expenses as well as an allowance for depreciation of equipment.

Source: Environmental Protection Agency

For example, studies of local treatment facilities have demonstrated the existence of economies of scale. As the wastewater volume increases from 2 million to 8 million gallons per day, the unit cost of BOD removal declines 50 percent.[22] The consolidation of many small plants could have resulted in substantial savings. However, the grant program has consistently promoted the decentralization of treatment facilities.

The underlying cause of these inefficient expenditures is standard "pork barrel" politics. As is usually the case with major capital investments in public works, Congress has attempted to spread the grants around to as many members' districts as possible. As a result, the largest systems, which treat about 70 percent of the wastewater in the U.S., have received only 40 percent of the funds.[23]

For those systems that have received grants, EPA's technological requirements have increased construction costs and limited the use of alternative systems. An assistant executive director of the U.S. Conference of Mayors notes that "if cities had more flexibility on technology and specifications, they could stretch the federal investment infinitely further."[24]

Since 1956, the financial commitment to the construction of local POTWs has always been viewed as a federal "incentive" -- an effort to speed up compliance with effluent standards and advance the attainment of water quality goals. Professor Abel Wolman of Johns Hopkins University has disputed this presumption of a federal "impetus to construction." In examining prior annual expenditures without federal aid, he notes that the "intended acceleration of activities proved to be not much greater than was normally the case in history without federal or state grants."[25]

In fact, there is reason to believe that the grants program has often been a disincentive. An EPA report on the Composite Correction Program (CCP) offers some insights. Carried out over a two-year period in the state of Colorado,

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The largest treatment systems, which treat 70 percent of the wastewater in the U.S., have received only 40 percent of the construction grant funds.

CCP's main purpose was to improve a specific POTW's compliance record by "identifying, prioritizing and eliminating specific factors that limit performance at an individual plant."[26] It stressed the development of alternative solutions to major, capital-intensive plant construction. The final report offered the following observations from interviews conducted with local administrators.

- All owners felt a responsibility for their plant. However, their assessment of whether or not they were meeting that responsibility was often not related to plant performance. It was usually related to minimizing local costs and obtaining federal grants.
- Most owners/administrators of plants which were not in compliance expressed the opinion that [the matter] was out of their hands until they could get a grant.
- One operator felt he could have done better but was told by the "up-town" officials not to worry about it because doing better would hurt their chances [of getting] a grant.
- Four of five facility owners would not commit [themselves] to pursuing any recommendations of the CCP which required [more than] a very minor capital expenditure since they were waiting for grant funds.[27]

The Clean Water Act's regulatory strategy is also inefficient. The political appeal of uniform effluent standards is in their appearance of fairness. Ostensibly, all polluters are treated equally. Yet, within a given industry, not all firms will incur the same costs for the specified level of control.

Nationally uniform standards are also inefficient because they do not account for regional differences in the nature of water quality problems. Standards relate to effluent quality and not water quality, an orientation that ignores a key issue: The degradation of water quality prevented by effluent standards of e[illegible]creasing stringency is slight, but the costs incurred can be huge.

Moreover, as an ever increasing degree of effluent purity is required, the marginal cost of each additional increment of pollution removal rises rapidly. For example, economists studying municipal wastewater treatment plants found that the cost of removing up to 90 percent of daily BOD is 22 cents a pound; roughly $1.70 a pound is required to remove an additional 5 percent, and $5.44 for the next 3 percent.[28] On average, the marginal cost of BOD removal at the third level is 20 times higher than the marginal cost at the first level.[29]

Sharply rising marginal costs are "pervasive" in water pollution abatement.[30] Thus, in the case of point sources where Best Practicable Technology has removed over 90 percent of toxic heavy metals such as lead or copper, the cost of removing the next 5 percent could very well exceed the cost of removing the first 90 percent. Yet, any benefits from the tighter controls will be more than offset by uncontrolled pollution from nonpoint sources.

Many environmentalists dismiss this type of analysis, claiming that because Best Available Technology will remove millions of pounds of toxics, there has to be *some* improvement in water quality. However, since many more millions of pounds of toxics enter the nation's water through runoff, it will cost a substantial amount to remove what is, in reality, only a tiny portion of the total amount of toxic water pollution.

In contrast, the nature of nonpoint sources seems to ensure that some potentially more cost-effective means of stormwater control will result in substantial pollution abatement. Civil engineers refer to the "first flush phenomenon" to describe the way in which storms transport pollutants; the initial stages of a storm carry a majority of the pollutants. Some studies have indicated that capturing this initial portion of a storm—approximately one-fourth of runoff flow—will result in a removal of nearly two-thirds of all toxic heavy metal pollutants.[31]

Administrative Shortcomings

Pursuing a policy of effluent standards is not only costly and inefficient; it is also an enormous undertaking. EPA had to issue discharge standards and permits; establish a functional enforcement procedure; and develop a nationwide monitoring network to track progress. Every aspect of EPA's administration of the program has been fraught with delays and difficulties.

Unrealistic expectations of the agency has undoubtedly contributed to EPA's problems. The legislation is complex and inflexible. EPA's technical capability has also been overestimated. Congress has repeatedly set unrealistic deadlines; in most cases standards were to be set within 120 to 180 days.[32]

Promulgating regulations for separate industrial categories is not a simple task, and EPA has never been given sufficient time to do it. This lack of adequate preparation further complicated the onerous burden of writing and issuing permits, which literally swamped the EPA and those states with EPA-approved NPDES programs. Between 1972 and 1976, 65,000 first-round permits based on "best professional judgment" were issued. This did little to insure

the uniformity that Congress originally envisioned. In 1980, the House Public Works and Transportation Committee declared that the program was on the "verge of collapse"[33] and that it had become "a paper shuffling game of monumental proportions."[34]

The permit-issuing process has become "a paper shuffling game of monumental proportions."

EPA still faces a serious backlog of the five-year permits. The "second-round" of permit issuance continues to be delayed by the lack of effluent standards. Five out of 29 industrial guidelines have yet to be promulgated. In 1982 almost half of all "first-round" permits expired. By late 1984, almost all of the remainder expired as well. In addition, EPA has been unable to process applications for new permits. In 1982, for example, there was a waiting list of over 16,000 applications; an additional 2,000 applications are filed every year. As a result, the backlog is not likely to be reduced significantly at current levels of reissuance, leading many to suggest a permit with a longer life.

Economical Alternatives

Effluent Fees

Many economists have long advocated "taxing" pollution through effluent fees as a more efficient alternative to the current regulatory system. They argue that charging polluters for the pollution they create increases incentives for companies to find innovative ways to decrease their wastewater discharges.

Ideally, fees would be set equal to the marginal benefit of pollution control. As long as the marginal control costs are less than the fee, polluters would have an incentive to reduce the volume of polluted effluent, and to develop the most cost-effective control techniques.

These fees would have the effect of raising costs and hence prices for products whose production generates a lot of pollution. Consumer demand would tend to shift to products which pollute less. In order to stay competitive, high-polluting producers would have to economize on pollution, just as they would on any other costly factor of production. Since pollution imposes burdens on the environment, the costs of cleaning up that pollution should be reflected in the price of a product whose production generates this burden.

A study of the Delaware Estuary demonstrates the potential savings from such an approach. Effluent fees—once set high enough to achieve the desired level of water quality—would cost approximately one-half as much as a regulatory program relying on uniform standards requiring an equal percentage reduction by all polluters.[35]

In West Germany, federal water pollution control—a system of standards, permits, and enforcement—has not succeeded in reversing the decline of water quality all over the country. Yet, use of an effluent tax scheme in the Ruhr Valley has had a positive impact there, even though over two-thirds of the country's iron and steel production is located in the region.[36]

Genossenschaften are regional water associations authorized to manage water quality by special legislation. Each *Genossenschaft* charges polluters a fee based on their proportionate wasteload. Revenue is used to finance the association's activities. In effect, the fee amounts to a polluter's share of the association's operating costs. It does not relate to the treatment costs an individual firm would incur. The fee is also unrelated to important factors such as assimilative capacity.

Although the fee system does not fully adhere to principles of marginal-cost pricing, economists defend its effectiveness, noting that:

> A comparatively crude method that is generally correct in principle will often realize the major share of the gain that could be achieved by more complex and conceptually more satisfying techniques.[37]

Marketable Permits

For a number of reasons, effluent fees are unlikely to be utilized in the United States. Perhaps the most significant constraint on the use of this alternative policy tool is that it is not specifically authorized under the Clean Water Act. Even if the EPA were to attempt to implement one, a fee system could not withstand a court challenge, since Congress already considered it and rejected it.[38]

Despite restrictions imposed by the Clean Water Act, one alternative to the technology-based effluent standards approach has some potential for use within the confines of the law.[39] Under a system of marketable permits, a state agency distributes permits allowing discharge up to a level that would not compromise the desired standard of water quality. These permits could be either sold or simply issued outright, but in both cases dischargers could resell the permits to each other. In theory, at least, this "market" for permits would determine a price for each unit of pollutant based upon the cost for treating the last unit (marginal cost) of discharge under the most efficient method.

Many economists believe this approach would accommodate economic growth. A firm wishing to establish a new factory along a particular watershed would simply buy existing permits. No advance approval would be required for such a purchase. The total amount of discharge would have to remain constant, meaning that only those companies selling permits would have to adjust treatment processes because of the new discharge. Due to market forces, the firm selling a permit to the new discharger at the lowest price would also be the one facing the lowest costs for treating the additional waste. As a result, growth in the aggregate treatment system would occur using least cost methods.

One other advantage of marketable permits is that enforcement and administration of the process would be easier and more cost-effective. The agency would not have to handle the complex information of treatment technology. The choice of pollution control equipment would be left entirely to polluters;

they would directly suffer from using less than optimal pollution control techniques.[40]

Many practical innovations would produce a more cost-effective control policy. Besides effluent fees, and marketable permits, researchers have also advocated other cost-saving improvements such as the regionalization of municipal wastewater treatment[41] and the development and implementation of variable effluent standards. Regionalization would take advantage of the economies of scale in wastewater treatment, while variable effluent standards would relate permit requirements to seasonal variations in the assimilative capacity of a stream. For instance, a study of the DuPage River in Illinois concluded that the total variable cost of wastewater treatment could be reduced by 34 percent with seasonal adjustments to effluent standards.[42]

Nonpoint Source Control

These alternative regulatory procedures are designed largely to increase the efficiency of controls on point sources. Such innovations are worth pursuing in those instances where the marginal benefits equal or exceed the marginal costs. Nevertheless, as long as nonpoint sources remain uncontrolled, the current regulatory approach cannot fully resolve water quality problems in the U.S.

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Agricultural Pollution. According to the U.S. Department of Agriculture (USDA), agriculture is the "most widespread cause of nonpoint pollution."[43] Runoff from cropland, rangeland, pastureland, forest land and livestock facilities carries pesticides, fertilizers and animal wastes to adjacent streams. The USDA found that 15 percent of all fertilizer applied to cropland washes off into surface waters; 5 percent of applied pesticides runs off the land; and that 25 percent of all livestock operations have the potential to degrade water quality.[44]

Soil erosion can also be an important factor in agricultural pollution, since excess sedimentation reduces the natural assimilative capacity of a stream. Also, sediment often binds pollutants, which can cause dangerous concentrations to build up in a stream. USDA estimates that over 5 billion tons of soil are lost annually from agricultural lands. (An additional one billion ton loss results from eroding roadsides and construction sites.)[45] In 1934, soil was eroding at a rate of roughly three and one-half billion tons per year. The problem seems to have worsened despite the fact that the government has spent $18 billion on soil conservation programs.[46]

Obviously, soil conservation programs have not been properly targeted. Ninety percent of all "sheet and rill" erosion (caused by runoff) comes from only 10 percent of all cropland. The USDA believes that with better targeting

three times as much erosion could be prevented at no additional cost.[47]

Large portions of the farm sector are in transition. Many of the old soil conservation techniques such as terracing have become too expensive in a farm economy of rising production costs and declining crop prices. Also, changes in equipment have forced some farmers to abandon old methods. Some equipment is too wide for old terraces; many windbreaks have been cut down because individual farmers have sought to increase the amount of acreage under cultivation.

Soil erosion is influenced by federal farm policies as well. With attractive price supports for certain crops, the federal government has induced many farmers to become "sodbusters" and plow up very fragile and erodable soil. Richard D. Siegel, a USDA deputy assistant secretary, says that "there is a direct connection between the degradation of fragile soil and the wheat price supports."[48] In 1984, for example, the federal target price for a bushel of wheat was nearly a dollar above market price, giving farmers strong incentives to plow up marginal land for the heavily subsidized crop. In the absence of high price supports, the amount of marginal acreage under cultivation would probably decline, since it is the least productive land.

There is no comprehensive policy prescription for the control of agricultural pollution. Too many natural factors are variable—climatic conditions, like the annual amount of rainfall, and physical features of the watershed, such as elevation and contour, are not uniform. These factors influence farm management decisions such as crops produced, and the use of fertilizer and pesticides. Of course, federal farm policies, consumer demand (both foreign and domestic), and the price of production inputs also affect management practices. Thus, this complex problem requires site-specific solutions.

Under authorization of Section 208 of the 1972 law, many nonpoint source control techniques were developed by state and federal officials. Even though many of these "Best Management Practices" (BMPs) have been shown to be cost-effective, they have not been widely applied. They involve: controlled frequency and timing of fertilizer and pesticide application; management of the timing and extent of irrigation; double cropping for continuous soil coverage; and conservation tillage. Besides clean water, farmers could undoubtedly accrue additional benefits from BMPs. For example, an excessive loss of soil and chemicals is expensive. Reducing these losses is obviously in the best interests of the farmer as well.

Conservation tillage is a general term used to refer to techniques that do not disrupt the soil as much as traditional farming methods. The most advanced type of conservation tillage is "no-till" plowing, a system that forgoes plowing up the residue from last year's crop; instead, it is left on the ground during the winter and through to the spring when a new crop is planted down through the residue. This has the effect of holding the soil and preserving its moisture. Also, the practice saves time, labor and energy costs associated with residue plowing.

Unfortunately, conservation tillage is no panacea. On farms with poor soil

drainage, for example, such techniques may actually raise costs and lower average yields per acre.[49] Also, it is not entirely clear that these techniques decrease the amount of pesticides that wash off into streams.[50] Nevertheless, for a significant number of farms, these techniques remain an attractive option. In these instances, farmers will move toward these economical techniques without major government programs or "incentives" if they are properly informed about the benefits.

Currently, about one-fourth of all cropland is cultivated under some form of conservation plowing.[51] That percentage should increase if farmers become convinced that it is in their best interest to change their methods. In Iowa, for example, cropland acreage utilizing no-till plowing techniques increased nearly fourfold between 1980 and 1983. Acreage under conservation tillage increased by roughly one-fifth.[52]

Urban Runoff. As discussed previously, runoff from city streets is also a significant source of pollution. EPA data show that about one-half of the 127 priority pollutants listed by the agency are found in urban runoff samples at any given time.[53] The type of pollutants present and their concentrations depend on a number of related factors such as the degree of urbanization, the type of land use, population, the density of automobile traffic and the level of air pollution just prior to rainfall.

The degree of sedimentation can be the controlling factor in urban nonpoint source pollution. Even though sediment washed away from urban construction sites accounts for only 5 percent of sediment loads nationwide,[54] localized impact can be severe. A report from the U.S. Water Resources Council indicates that small construction sites in some eastern urban areas increase sedimentation of waterways up to 5,000 times.[55]

Controlling urban runoff can coincide with the control of flood flows. Runoff is caused by storms of an unusual intensity; a hard rain of long duration essentially overwhelms a city's capacity to contain storm flows. Sewers overflow and carry pollutants to waterways. Thus, flood control reduces pollution control.

Most cities already have detention basins as a primary method of controlling flood flows. These basins are readily convertible to accommodate another purpose, the removal and storage of polluted runoff. These adaptations have proven to be effective in many cases already. For example, in Montgomery County, Maryland, recently constructed detention basins prevent over 90 percent of pollutants from reaching surface waters.[56] Flood control is a local problem, the economics of which are not beyond the means of local authorities. The EPA's National Urban Runoff Program concluded: "Stormwater management planning need not involve expensive technical studies...Effective local planning can alleviate the need for costly remedial public works."[57]

Prospects for a Nonpoint Policy. Despite its potential as a cost-effective water quality improvement policy, controlling diffuse area sources has always been

limited by political difficulties. An examination of the Clean Water Act's nonpoint source control provision—Section 208—bears out this conclusion. Section 208 was enacted in 1972; yet as late as 1980, the Council on Environmental Quality (CEQ) declared that progress on nonpoint source pollution was "negligible."[18]

Section 208's ineffectiveness has been attributed to its lack of binding authority and a general bureaucratic resistance at the state, local and federal level. Funding was also a problem. From its inception, both the White House and the Office of Management and Budget (OMB) were opposed to the program's 100 percent grants. By the end of the Carter Administration, 208 funds had been entirely eliminated; the Reagan budgets have never sought to restore them.

Political resistance to 208 is easily explained. Traditionally, authorities at every level of government have been understandably reluctant to regulate land use, which is likely to be an integral part of any control strategy. In fact, the relatively weak 208 provision was enacted to serve as a political straw man. Congressional staffers who drafted the 1972 legislation claim that this section was largely an effort to stave off a proposed National Land Use Act that had already passed the Senate twice.[19] Section 208 was a less intrusive alternative that everyone could support. Similarly, in 1984, House staffers drafting amendments to the Clean Water Act were forced to weaken their initial nonpoint source control provisions in order to keep support for the entire bill together. The key opposition to land use controls is, of course, agricultural interests—perhaps Washington's most effective lobbying force.

Obstacles to Innovation

A host of practical problems makes changes in the status quo in water pollution policy difficult. Many of the concerned parties—including both the regulators and the regulated—have an interest in maintaining the current approach, in spite of its many inefficiencies.

Consider the resistance to an effluent fees approach. Under a fees system, firms would have to pay a tax for each unit of pollutant discharge above zero. The total control cost is the cost of reducing pollution plus the charge for residual units of pollution. Under the effluent standards approach, there are no costs beyond those associated with reducing pollution to the mandated level.

Changing the system would produce winners and losers. Firms with high abatement costs under the current system would have the opportunity to save money under a fee system; they could reduce pollution to the point where the marginal control cost equals the charge and then pay the charge on any residual units. Yet, for firms currently meeting the standard at relatively low cost, controlling pollution to the point where marginal costs equal the effluent charge and then paying the tax on residual effluent could increase their costs.

A study of pollution control along a 30-mile stretch of the Black Warrior

Table 3

ESTIMATED COST OF CLEANUP IN 30-MILE SECTION OF BLACK WARRIOR RIVER UNDER ALTERNATIVE APPROACHES

Pollution Source	Daily Cost of Meeting Existing Standards	Daily Cost of Effluent Fees	Gain (+) or Loss (−)
Empire Coke	$ 116.00	$ 0	$ 116.00
B.F. Goodrich	72.90	0	72.90
Gulf State Paper	94.40	350.80	−256.40
Hunt Oil	30.40	5.60	24.80
Reichhold Chemicals	147.30	228.50	−81.20
Warrior Asphalt	15.90	3.20	12.70
City of Northport	122.20	145.20	−23.00
City of Tuscaloosa	1,240.40	491.10	749.30
	$1,839.50	$1,224.40	$615.10

Source: Water Resources Bulletin

River (see Table 3) bears out these conclusions. It would be less costly to achieve the same amount of control under an effluent fees system than under uniform standards—$1,224 a day, compared to $1,839 a day. Nevertheless, three of the seven major polluters—Gulf State Paper, Reichhold Chemicals, and the city of Northport—would pay more under a system of fees.[60]

The effluent fees approach has also had very little appeal in the political system, particularly among Congressional staffers. A study of attitudes among the most active participants in environmental policy formation found that most rejected a pollution tax on philosophical rather than practical grounds.[61] Specifically, they oppose charges on the grounds that they would constitute a "license to pollute." Also, they feel that putting a price on the act of polluting not only reduces the perceived value of environmental quality; it also amounts to an attitude of moral indifference towards polluters.

Finally, even when innovations and practical adjustments are potentially economical, they can be inconsistent with the provisions of the law. In effect, zero-discharge and swimmable/fishable goals often reduce the bill's flexibility, ultimately limiting EPA's ability to fight pollution. Even "goals" have legal ramifications. In the past, the courts have used them to interpret the Act.

In 1982, for example, efforts by the EPA to allow more state control over designation of the use of a particular stream were successfully challenged on the grounds that they were an abandonment of the swimmable/fishable goal. According to congressional aides who drafted the original bill, such use of the

goals was not intended. Still, proponents of the current bill insist on retaining them in order to prevent a return to the largely ineffective "water quality standards" approach that dominated water pollution regulation prior to 1972.

Unfortunately, it appears the water quality goals have become just as obstructionist as the water quality standards approach was in preventing effective water pollution control. GAO notes that EPA has not exempted any waterways from the swimmable/fishable goal under the "wherever attainable" provisions.[62] Consequently, it has been automatically assumed that the goal should be obtained in all waterways, an over-simplification that ignores the costs and benefits of such actions.

Due to its own administrative burden, EPA is not really in a position to start tinkering with the program. The pretreatment program provides a good illustration of how bureaucratic resistance at the national level stifles local innovation.

In 1972, pretreatment standards were to be developed pollutant-by-pollutant, an impractical approach to comply with. In 1977, Congress forced EPA to develop a more comprehensive control program. First, EPA had to develop specific prohibitions that apply to all indirect discharges; these stress substances that would interfere with the effective operation and maintenance of the POTWs.

Next, all POTWs that receive waste from a significant number of indirect dischargers were required to establish a local program—their own legal, administrative and technical mechanisms with which to regulate them. EPA published these general regulations one year later but it has taken considerably more time to set up the final thrust of the program—the development of technology-based categorical standards, which are analogous to technology-based limitations for direct discharges.

The 1977 amendments also required EPA to establish industry-by-industry pretreatment standards for 65 toxics associated with 22 industrial categories. Since then, the number of targeted pollutants has doubled, and the list of associated industrial categories has been expanded to include 12 additional groups.

As EPA struggled to develop and issue technology-based standards for an ever expanding group of industries and pollutants, many cities simply went ahead and developed their own methods, some of which focus on water quality and not effluent quality. Not surprisingly, once the EPA succeeded in issuing their standards, a conflict ensued: Should localities be forced to replace their own programs with the federal one?

In the interests of regulatory reform, the EPA, under the controversial Anne Gorsuch Burford, proposed a "local option" in 1982. This program would have allowed cities with an effective pretreatment program already in place to exempt, either totally or partially, their industrial discharges from national standards—where these were deemed unnecessary to achieve water quality goals, or to meet the basic requirements of the law.

As the reauthorization debate dragged on, environmental groups lobbied effectively against the local waiver provision and congressional support waned.

EPA support was withdrawn in 1983 when the new Administrator, William Ruckelshaus, reluctantly decided in favor of national standards on the grounds that the review of waiver applications would overwhelm the agency and delay implementation of the whole program. This policy stands under the current Administrator, Lee M. Thomas.

Current Legislative Proposals

Since 1981, the reauthorization of most major federal environmental laws has been stalled. Serious divisions in Congress have left a number of laws—including the Clean Air Act and the Safe Drinking Water Act—in a legislative limbo. Nevertheless, the 99th Congress appears intent on reauthorizing the Clean Water Act this year.

On the opening day of the first session, leaders of the House and Senate environmental committees introduced bills to renew the Act. By May 1985, committee markup of this legislation was concluded. On June 13, 1985, the Senate unanimously approved S.1128. In the House, H.R.8 is due to reach the floor for a vote in July or August of 1985.

The Major Issues

None of the proposed amendment packages offers any dramatic changes in policy. An examination of six major Clean Water provisions follows, with emphasis on the differences and similarities of the three bills in these areas.

BAT/BCT Compliance Deadlines. The 1977 amendments directed EPA to develop more stringent standards for industry--Best Available Technology (BAT) for toxic pollutants and Best Conventional Technology (BCT) for conventional pollutants. These were to be issued quickly enough for industry to reach compliance with the standards by July 1, 1984. To date, final regulations for five out of 22 industrial categories have not been promulgated, causing industries, particularly the chemical industry, to miss this deadline.

While there is general agreement that the compliance deadlines need to be extended, there is some disagreement over exactly how this should be done. S.1128 requires compliance three years after the final BAT regulations are promulgated, but in no case later than July 1, 1988.

A bill drafted by the administration also requires dischargers to come into compliance within three years after final promulgation, but its outside deadline is more flexible than the Senate's. For effluent limitations (in whole or in part) established prior to July 1, 1985, the final date is July 1, 1988. For those standards promulgated after July 1, 1985, dischargers must comply within three years from the date final regulations are issued. H.R.8 is the most generous of all the bills. Like the administration's bill, it establishes a rolling deadline for compliance, allowing a maximum period of three years and six months after final promulgation.

Permits. The current life of a discharge permit under the Clean Water Act is five years. Many observers contend that the five-year term has led to serious

backlogs in permit issuance and reissuance. In addressing this problem, all three bills originally offered provisions that would extend the life of permits to 10 years. Each bill also contains a discretionary "reopener" provision that would allow permit modifications in cases where more stringent requirements are established by EPA.

However, during the markup of S.1128, environmental groups lobbied effectively against an extension, arguing that a 10-year permit would "freeze" pollution cleanup for too long a period because states rarely reopen permits in midterm. Thus, the final Senate bill retains the current five-year permit.

Post-BAT Water Quality-Based Effluent Limitations. Both the Senate and House bills contain provisions that would require states to identify "toxic hot spots"—those segments of streams that still do not meet water quality standards after all BAT controls are in place. Once these segments are listed, EPA and the states would then have to set individual control strategies for them. The legislation stresses a further control of point sources. Where they deem it necessary, the states and the EPA would develop standards from some dischargers that would be even more stringent than BAT.

S.1128 proposes a series of program deadlines—nine months for EPA to develop basic identification guidelines for the states; two years for the identification of "hot spots" by the states; two years for proposing new control requirements; and three years for industry compliance with the new standards.

H.R.8 expands the EPA role and tightens deadlines. The EPA, in cooperation with the states, would have one year to identify "hot spots," and an additional year to develop new standards. As in S.1128, industry would have three years to comply, however.

Nonpoint Source Control Programs. Both the House and the Senate are also seeking to implement nonpoint source control programs at the state level. H.R.8 directs states to develop a four-year program within nine months. If a state fails to submit a plan by that deadline, EPA must develop one for it. The federal agency must rule on all states' plans within six months of their submission. The bill authorizes $600 million over four years in grants to the states for up to 50 percent of program development costs.

In the Senate plan, states have 18 months to submit their plans and EPA has six months to evaluate plans. The Senate bill authorizes a total of $300 million to be spread over a three year period, with $200 million earmarked for grants distributed proportionately to states on the basis of a set formula. These grants can cover up to 75 percent of a state's program development costs.

Construction Grants. With the authorization for construction grants due to expire on September 30, 1985, the future direction of the program has received more attention than any other topic in the Clean Water Act debate. The administration bill is the most austere, calling for a complete phase out of the program over four years. The bill authorizes an initial $2.4 billion for 1986, and cuts this by 25 percent each year until the money runs out in 1990. The proposal also restricts funding to the completion of projects begun prior to February, 1985. And, in order to concentrate available funding on ongoing projects, the

bill eliminates "set-asides" for innovative or alternative projects, and rural programs. "Governor's discretionary funds"—which allow states to use money for purposes other than construction—are also eliminated.

The House bill authorizes $2.4 billion annually (the current grant level) in construction grants for four years. The proposal acknowledges that the construction grants program is winding down, and seeks to supplement it with a new type of financial aid to states. H.R.8 contains a four-year authorization of $6.6 billion in capitalization grants for the establishment of state revolving funds. States would be able to use the fund for construction loans and loan guarantees, interest subsidies on bonds and loans, and bond guarantees.

The Senate bill seeks to continue some form of construction funding through 1994. S.1128 authorizes $2.4 billion annually in construction grants for three years. A phasing out of these grants begins in 1989. The bill also contains a grant program for the capitalization of state revolving funds. An annual authorization of $2.4 billion would be split between the two programs for two years. In 1991, the entire $2.4 billion authorization would be devoted exclusively to capitalization grants. Over the next three years, this authorization would be reduced by 25 percent each year until the entire program is phased out.

Conclusion and Recommendations

Congress has consistently rejected the use of market oriented methods of controlling water pollution. It is surprising, however, that Congress also appears to be rejecting many minor reforms and innovations that could facilitate the implementation of water pollution policy and heighten its impact on water quality.

There are ample opportunities to improve the basic regulatory structure of the Clean Water Act. While there is little short-run prospect of fundamental reform—such as an effluent fees system—there are some practical adjustments that should be made to improve the efficiency of the current policy and make it more reasonable for both government and industry.

Establish Flexible Compliance Deadlines. The July 1, 1984 BAT compliance deadline has passed without EPA regulations being issued for five industry groups. Congress should grant these industries a reasonable amount of time, both to install the necessary equipment and to work out any difficulties with it after EPA standards have been established.

In the past, Congress has consistently set unrealistic deadlines, only to be forced to revise them once it became clear that they could not be met. The Senate plan—with its absolute deadline of July 1, 1988— represents more of this sort of wishful thinking. The Senate provision that allows up to three years from final promulgation for compliance should be retained and the specific outside deadline deleted. Congress should adopt the approach proposed by the Administration and the House. Though each differs in the amount of time allowed, both establish a rolling deadline that links compliance to the date of final promulgation.

Extend Permit Life to 10 Years. The current backlog of five-year permits cannot be eliminated at current levels of reissuance. Before state and federal authorities can even complete reissuance of permits already expired, previously reissued five-year permits will begin expiring once again. A 10-year permit will reduce the annual workload and help ensure that large backlogs do not accumulate in the future.

The extended life of the permit would be a move toward realism. Even when the permit issuing process is running efficiently, it takes at least one year for a final permit to be issued. Also, it can take up to three years to install the mandated treatment technology. The five-year limit does not really provide an adequate amount of time to test the effectiveness of treatment before the renewal application process opens. For the permit holder, a longer term would provide more certainty over the long run, making investments in pollution control technology more economical.

Shifting to a longer permit term should facilitate the modification of existing permits. Expired permits are enforceable, but their guidelines will not necessarily fulfill the goals of the Act. Most of the "first round" permits provide solely for the control of conventional pollutants. They do not always effectively control toxic wastes.

Despite its many advantages, the Senate and environmentalists oppose the 10-year permit on the grounds that it would somehow "freeze" cleanup for a decade. These claims are simply not valid. First, use of the 10-year permit would still be subject to limitations. For example, any permit with certain waivers would be held to a five-year term. Also, if a state and the EPA determine that a permit applicant has not consistently complied with any existing permit, the reissued permit would be restricted to a life of five years. According to the House Committee Report on the Clean Water bill,

> ...nothing in this provision infringes on the Agency's ability to establish shorter terms where the Agency deems it appropriate. Given the wide variety of permits and recognizing that the agency is just beginning to issue many major permits with toxic limitations for the first time, it is understood that EPA will need the flexibility to set maximum permit terms of less than ten years for some dischargers.[63]

Finally, any proposal for the new permit can contain an adequate reopener provision that would allow permit modification necessary to ensure that more stringent standards can be incorporated.

Expand Local Control over Pretreatment. Under ideal circumstances, localities should be able to design their own pretreatment programs. Pretreatment is a local problem. Plants that discharge into publicly owned treatment works (POTWs) are likely to differ in terms of the factors that determine the scope and necessity of a given pretreatment program. The type, the volume, and the extent of industrial wastes, as well as plant design and record of performance, are just a few of the possible variables.

Plants that already have an adequate pretreatment program should be given

the option to disregard national standards. For example, an intensive study was conducted on 41 POTWs in the state of Illinois, where it was determined that 86 percent of the in-stream plants discharging into POTWs were pretreating these wastes. The POTWs were not disrupted by industrial toxics, and they were meeting permit requirements. It was also determined that for 25 of the 41 POTWs studied, imposition of the federal pretreatment model would not result in any significant improvement in the existing program. For 13 of the POTWs, a federal program would result in "limited enhancement." Thus, at an estimated administrative cost of $1.5 million to the state, only one POTW would see significant improvement.[64]

Uniform standards for pretreatment create some questionable anomalies among various toxics. When James Peterson of the Illinois Institute of Technology compared the proposed pretreatment standards with the average treatment capabilities of an indirect discharger in particular industrial categories, he discovered that for some toxic metals the allowable discharge limits were 10 to 25 times lower than what could be removed under existing technology. Proposed limits for other wastes were 10 times higher than the amount that could be economically removed.[65]

Regrettably, cities who want a statutory waiver amendment to be incorporated into the Clean Water Act, and their allies in Congress (notably Senator Steven D. Syms, R-Idaho), appear to have given up their efforts to secure one. Instead, municipalities appear to be focusing their lobbying efforts on preserving the construction grants program.

Phase Out Construction Grants. Localities need to reassume responsibility for financing the construction of wastewater treatment plants. Federal grants were supposed to supplement local funding but instead have replaced it. Grants have often hindered progress—by causing project delays and overly complex treatment systems to be built.

All three current legislative proposals seek to phase out construction grants, but both the House and Senate bills would still maintain a substantial level of construction funding in the form of seed money for state revolving funds. Admittedly, this alternative approach has some appeal. It would give states more flexibility in meeting their wastewater treatment needs. Yet, it does little to promote the local responsibility that is so lacking in the current grant program.

Most state governments are in better fiscal condition than the federal government. According to the EPA, over half of all future construction will have to occur in the Northeastern and Great Lakes regions of the country. Significantly, many of the larger states in these regions are proposing tax cuts for fiscal 1986.[66]

Many states and localities are capable of financing their own construction, and establishing their own revolving funds. Georgia has already set up a revolving fund with state bonds. California, Mississippi, Utah, Ohio, New York, New Jersey, Massachusetts, and Texas have all proposed similar programs in their state legislatures this year.[67] The introduction of federal grants for the same purpose at this time will only discourage these efforts and similar efforts in other states.

Recent studies have demonstrated that it is possible to achieve water quality goals with reduced construction spending. For example, the Colorado Composite Correction Program compared the costs of upgrading existing plants with the estimated costs of construction under the Clean Water Act grant program, and found that the cost of complying through renovation averaged 19 percent of building a brand new plant.[68] An EPA study in Onondaga County, New York, concluded that relatively low-cost Best Management Practices (BMPs)—incorporating some minor system modifications and sewer maintenance—are "remarkably effective" in the abatement of combined sewer overflow.[69] If such overflows contribute substantially to a municipality's water quality problems, a small investment in BMPs would yield more immediate and certain improvements than a major investment in a new POTW.

Delay Any Post-BAT Strategy until Nonpoint Source Controls Are in Place. It will make little sense to proceed beyond Best Available Technology (BAT) guidelines for industrial polluters—at least until more municipalities come into compliance and an effective nonpoint source control program is implemented. Increasing the stringency of effluent guidelines at this point will result in very high control costs, but the benefits of this approach will be slight.

Though not designed to do so, use of Best Practicable Technology has resulted in substantial removal of many toxic heavy metals; in at least 26 industrial categories, annual discharges of lead, copper, zinc, and mercury were reduced by 90 percent or more.[70] More stringent BAT controls will reduce these toxics only slightly. The cost of removing a small amount of toxics beyond the BAT level of treatment may very well cost as much as it did to remove the first 90 percent. However, the water quality improvements resulting from these controls would be marginal, especially if nonpoint source pollution goes unchecked. In contrast, small investments in nonpoint controls will pay off in much larger returns.

A post-BAT program should not be codified in the Clean Water Act. As former EPA Administrator William S. Ruckelshaus has noted, EPA can carry out a post-BAT plan within the existing provisions of the law.[71] EPA should retain this discretionary power to implement programs. A congressional mandate could force EPA to take hastily conceived and inappropriate actions, particularly when Congress sets unrealistic deadlines.

Limit the Federal Presence in Nonpoint Control Programs. The site-specific nature of nonpoint pollution places clear limitations on the role of the federal government. A national program must be limited to oversight activities, information gathering, technical assistance and limited financial aid. Physical geography does not always coincide with the political map. There are many interstate waterways and watersheds. Thus, for nonpoint control programs to be effective, they must be regional in scope; a downstream state could implement the best possible set of BMPs, but unless its upstream counterpart did likewise, water quality would not improve appreciably. Thus, where states cannot come to an agreement, the federal government must assume responsibility for arbitration.

In contrast, groups such as the National Audubon Society and the League of Women Voters are advocating a stronger national program, with strict deadlines, and a clear and major federal commitment. Yet in doing so, they ignore the capability of state authorities and state programs that already exist. Currently, 44 out of 50 states have managed to develop EPA-approved nonpoint plants.[72]

A more uniform national program might rule out cost-effective linking of a nonpoint control program with other local interests like stormwater flood control or soil conservation. Measures taken to manage these other problems will bring about incidental (yet substantial) reductions in nonpoint pollution. Indirect control is the most attractive means of achieving water quality goals because relatively small investments will pay off in numerous benefits.

A multi-purpose control program will consist of Best Management Practices (BMPs)—a set of land use and land management policies. It seems unlikely that the long arm of the federal government could extend itself enough to implement an effective national BMP system, much less develop one. The abundance of potential variables requires that BMPs be as site-specific as possible, and traditionally, these regulatory issues have come under the jurisdiction of state and local authorities. Thus, any federally-initiated nonpoint control policy would depend on the active support of local governments. Also, because the federal government is already involved in ancillary activities like flood control, interagency cooperation is essential.

In agriculture, a major new federal initiative seems inappropriate. Rather what is needed is close cooperation between EPA's clean water activities and a variety of existing soil conservation and agricultural pollution control programs. The Department of Agriculture currently sponsors the Agricultural Conservation Program, the Soil Conservation Service, and, in cooperation with the EPA, the Rural Clean Water Program. Also, the Forest Service has attempted to control nonpoint sources through a variety of programs. Better management and coordination of existing programs should be a top priority.

In considering an overall policy mechanism to encourage farm nonpoint source control, these agencies and Congress should consider the successes and failures of government inducements in the past. Political reality demands uniform distribution of government incentives. Thus, subsidies and other financial "carrots" have a tendency to become transfer programs that have little impact on the problems they were intended to solve.

The best way to encourage farmers to use conservation techniques is to do just that: encourage them. If a government program can demonstrate the economic advantages of such techniques to a farmer, there will be little need to do anything else. The Soil Conservation Service has had considerable success already, simply through the use of this method. And, of course, any overall farm policy that improves the farm economy in general will create a more positive climate for innovation.

Notes

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